

The World Beneath Our Feet

An Introduction to Geology

Simon Tull



Hajar Mountains, northern Oman

Agenda

- Essentials of Geology
- Geology of East Yorkshire
- Geology & Industry
- Q & A



Wadi Ghul, northern Oman

Essentials of Geology



Geology

from Ancient Greek γῆ (gê) 'earth', and λογία (-logía) 'study of'

The science of the Earth, its chemistry, biology and physics and the links between them



Geological Timescale

Eon	Era	Period	Epoch		
Phanerozoic	Cenozoic	Quaternary	Holocene	← Today	
			Pleistocene	← 11.8 Ka	
		Neogene	Pliocene		
			Miocene		
			Oligocene		
		Paleogene	Eocene		
	Paleocene		← 66 Ma		
	Mesozoic		Cretaceous	~	
			Jurassic	~	
		Triassic	~		
	Paleozoic	Permian	~	← 252 Ma	
			Carboniferous	Pennsylvanian	~
				Mississippian	~
		Devonian	~		
		Silurian	~		
Ordovician		~			
Cambrian		~	← 541 Ma		
Proterozoic	~	~	← 2.5 Ga		
Archean	~	~	← 4.0 Ga		
Hadean	~	~	← 4.54 Ga		

International Chronostratigraphic Chart, after www.stratigraphy.org

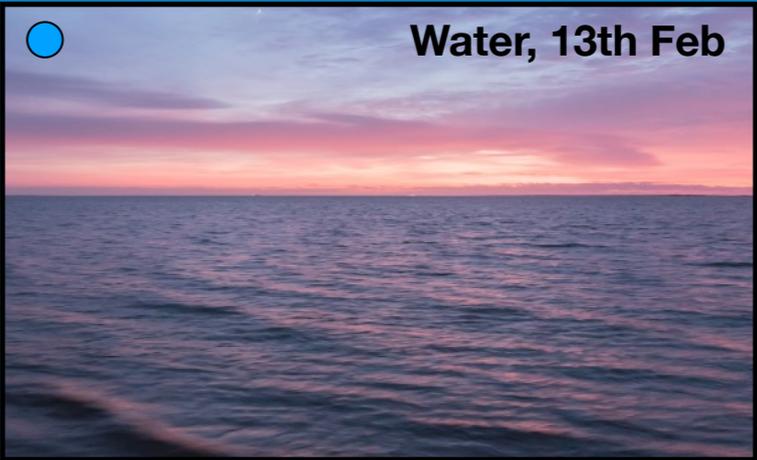
The KPg (KT) Boundary, Denmark



- Deep time.....The Geologists' USP
- Measured in millions ++ of years
- Earth is 4500 million years old
 - Ages are from "Radiometric dating"
 - e.g. Uranium → Lead
- Eons, Eras, Periods, Epochs
- Distinct phases in the development of the Earth, e.g.
 - Jurassic (age of the dinosaurs)
 - **Cretaceous (chalk-bearing)**
 - **Pleistocene (ice ages)**
 - Holocene (now) or "Anthropocene" (Age of Humans)

Geological Timescale

January	February	March	April
	●	●	
May	June	July	August
September	October	November	December
		●	●



...If all of geological time was represented by one calendar year

On the Rocks



Sandstone, Oman



Limestone, Vietnam



Basalt, Iceland

Rock Types & the Rock Cycle

Sedimentary Rocks



Limestone



Sandstone

Metamorphic Rocks

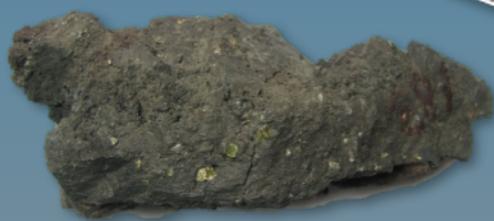


Slate



Gneiss

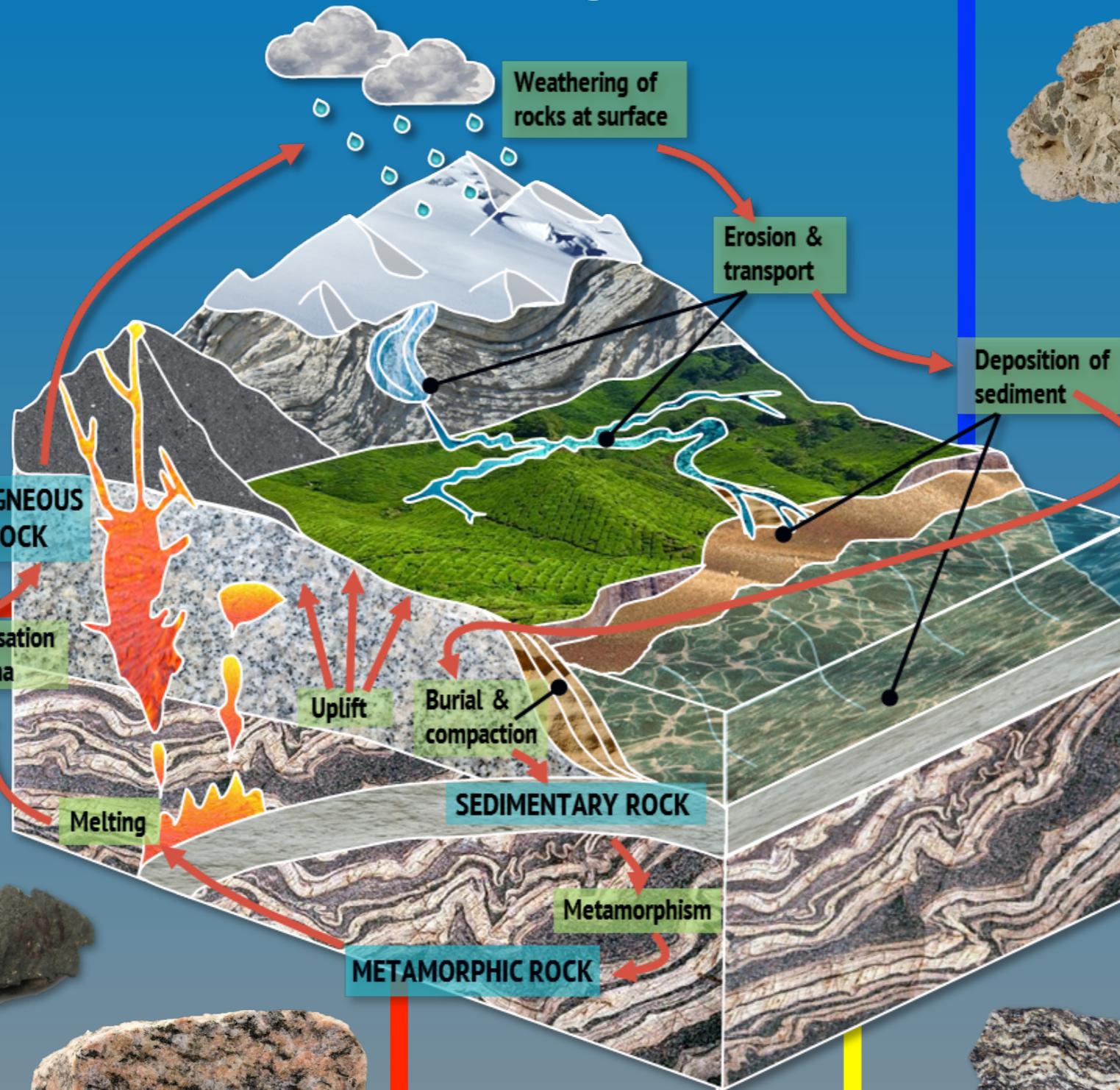
Igneous Rocks



Basalt



Granite



Dynamic Earth

Kīlauea, Hawai'i - July, 2025



USGS 2025

Strokkur, Iceland - August 2018



Plate Tectonics

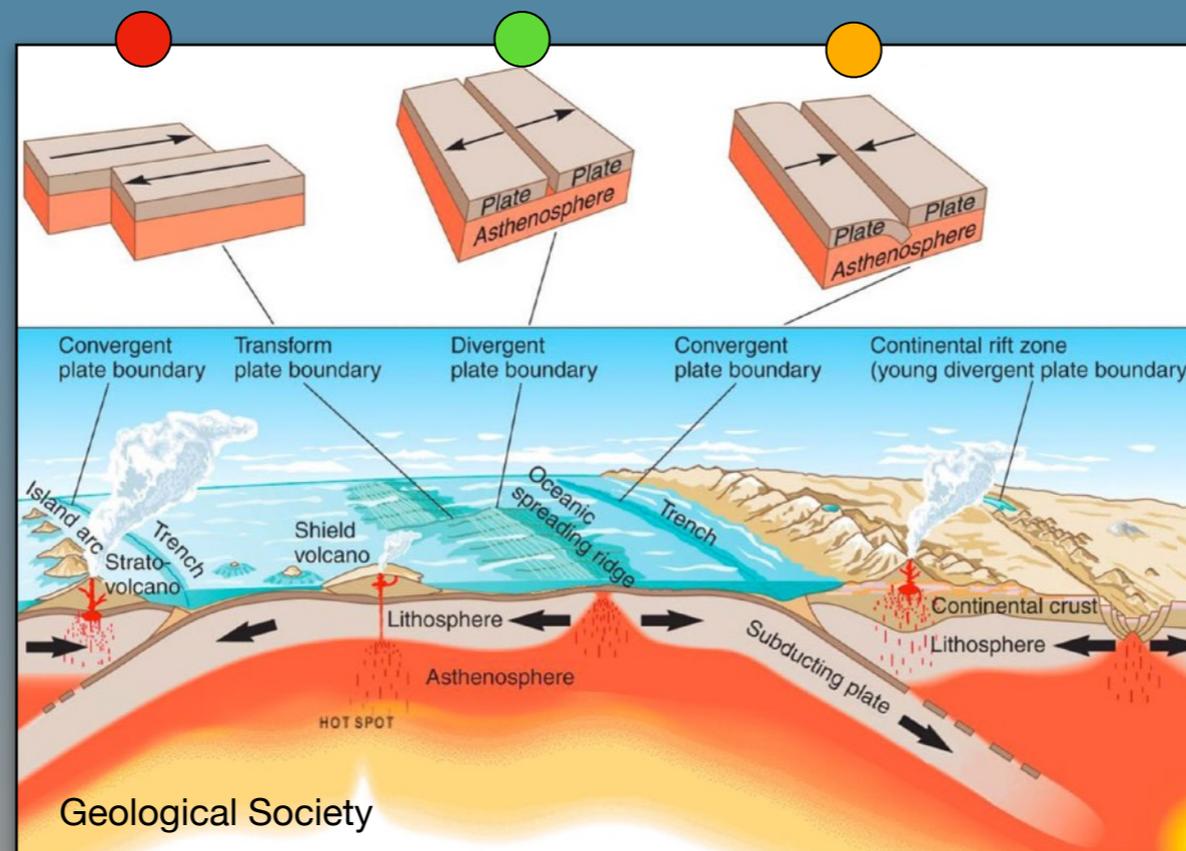
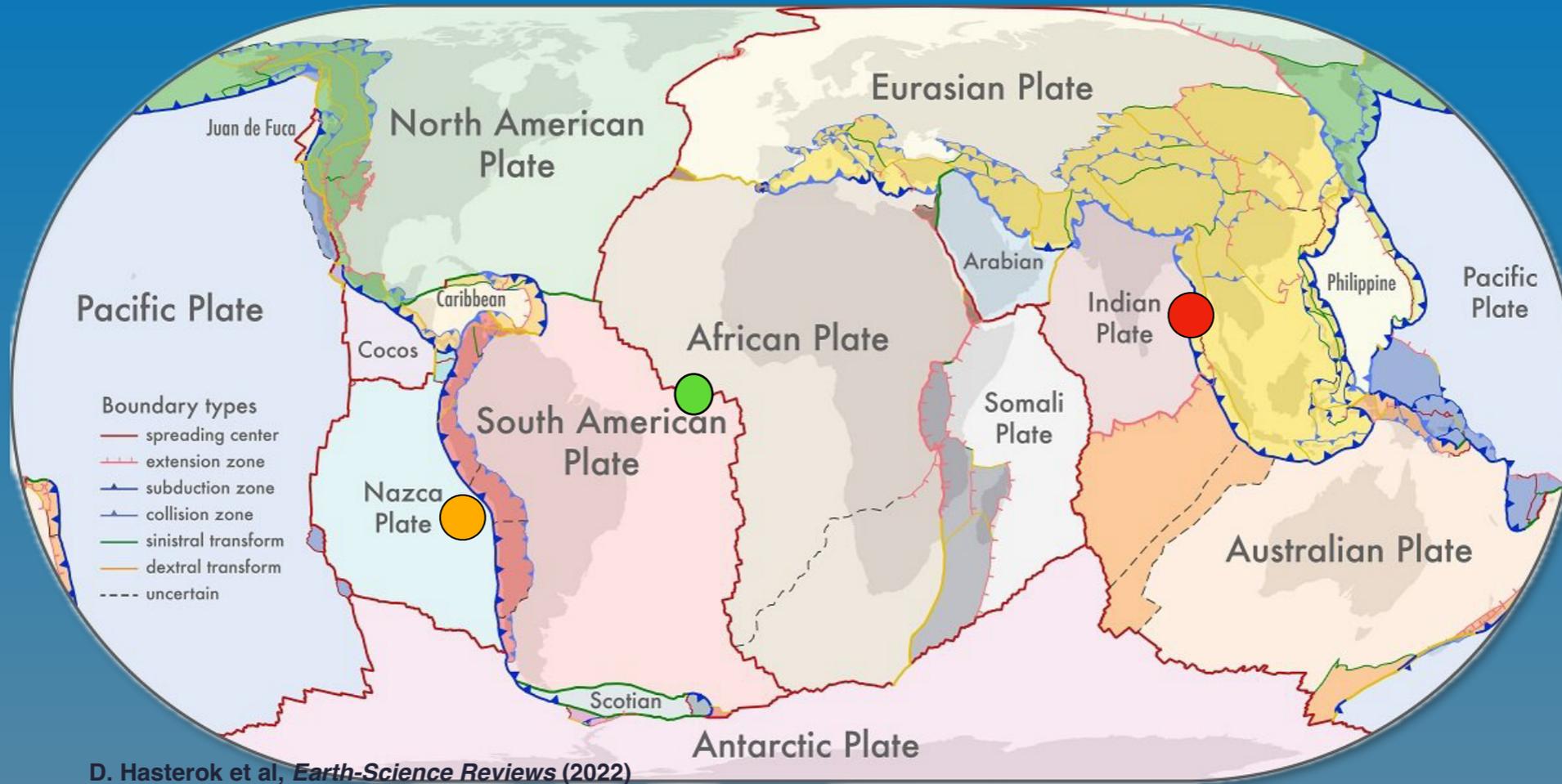


Plate Tectonics

Myanmar - M7.7 Earthquake, March 2025

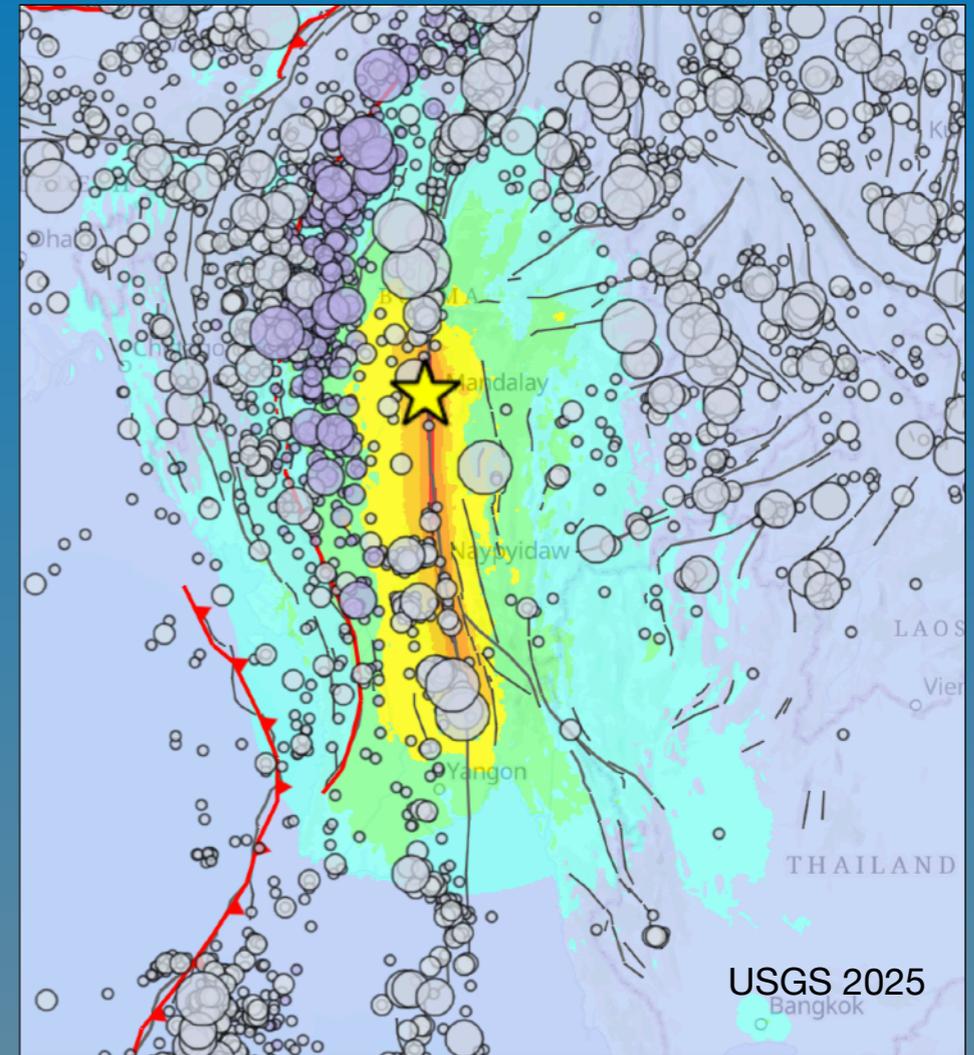
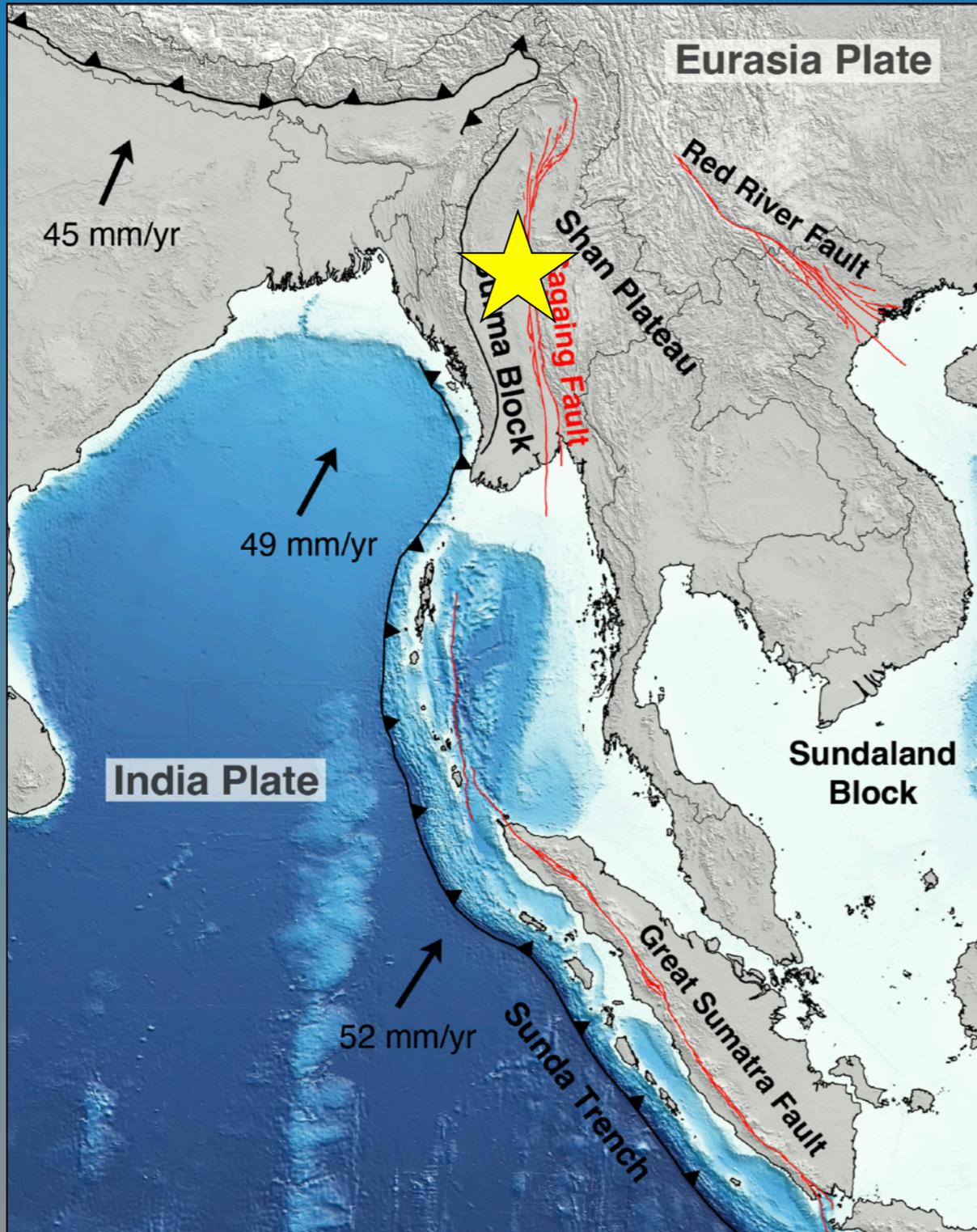
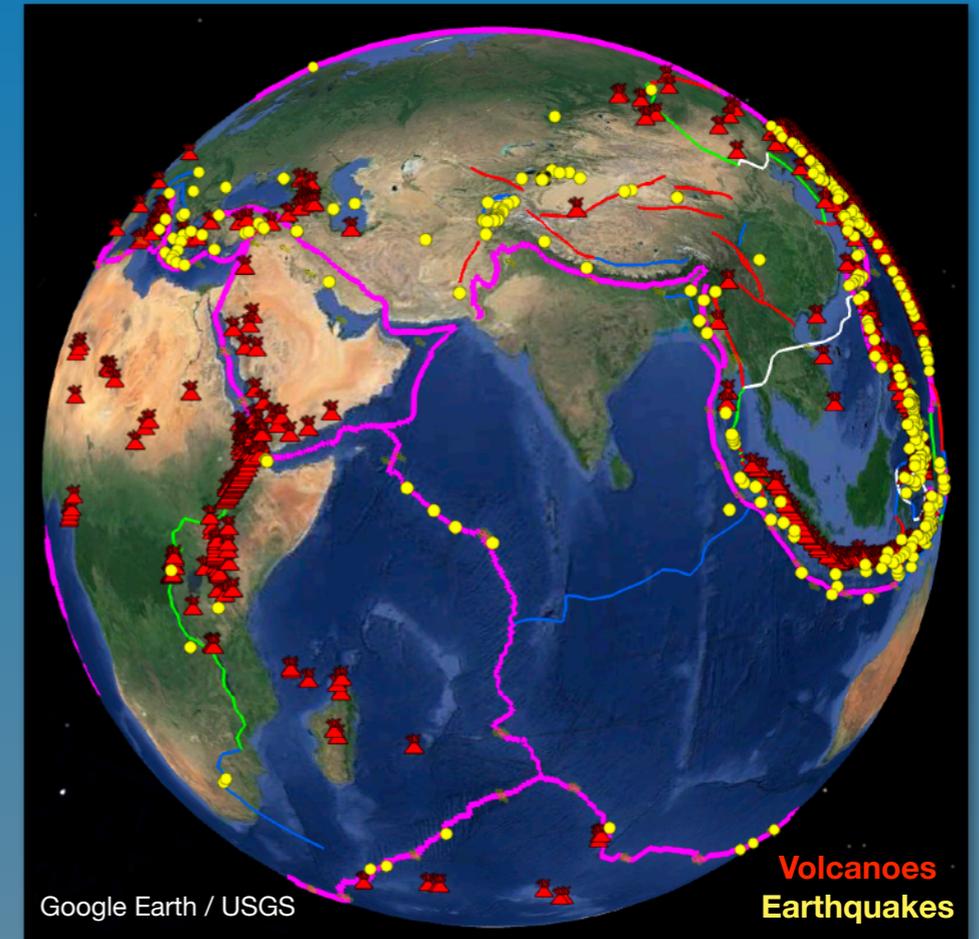


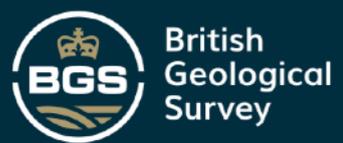
Plate Tectonic Theory



- Theory developed mid-1960's
- Provided a mechanism for Continental Drift
- Paradigm shift in our understanding of the Earth
- Unifying theory in Earth Science



Geology of East Yorkshire



GeoIndex Onshore



Data

- Faults 1:625,000 scale
- Superficial deposits 1:625,000 scale
- Bedrock geology 1:625,000 scale
- Ordnance Survey Terrain 50 DTM

Add Data Show Legend



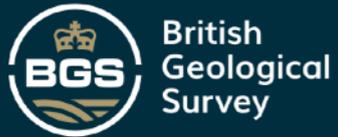
Location: 506029, 394892

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Geological map of East Yorkshire



GeoIndex Onshore

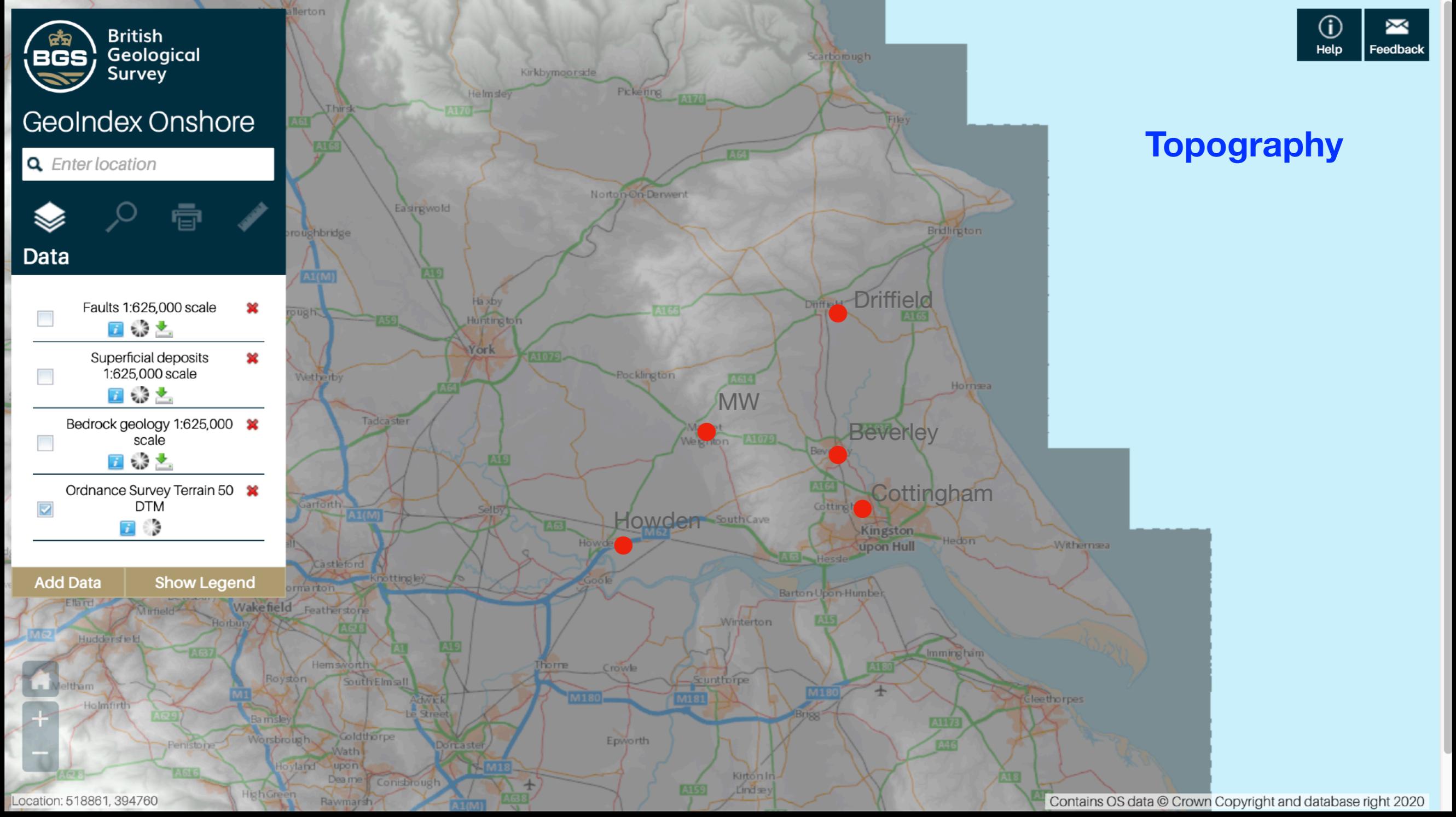
Enter location



Data

- Faults 1:625,000 scale
- Superficial deposits 1:625,000 scale
- Bedrock geology 1:625,000 scale
- Ordnance Survey Terrain 50 DTM

Add Data Show Legend



Topography

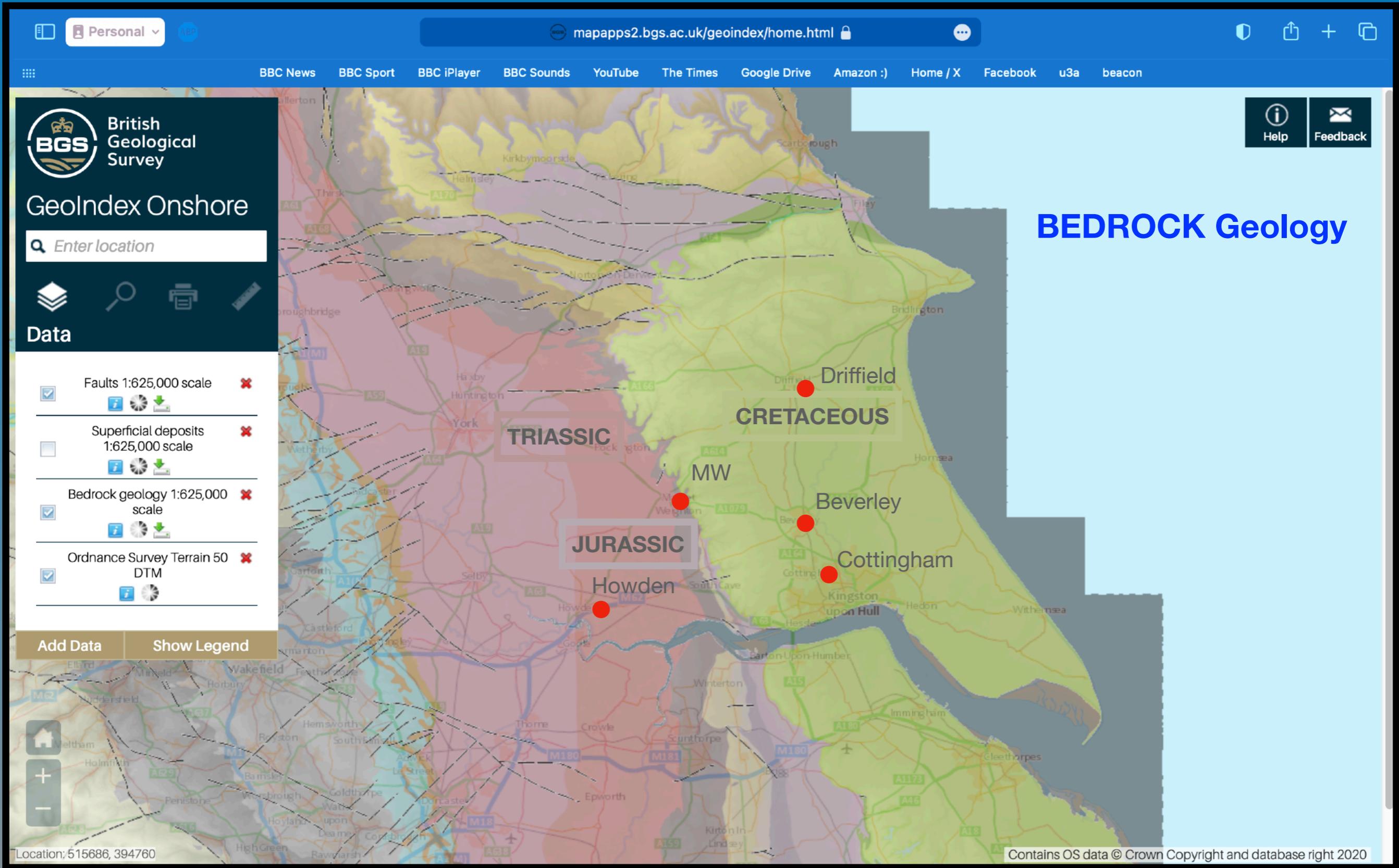
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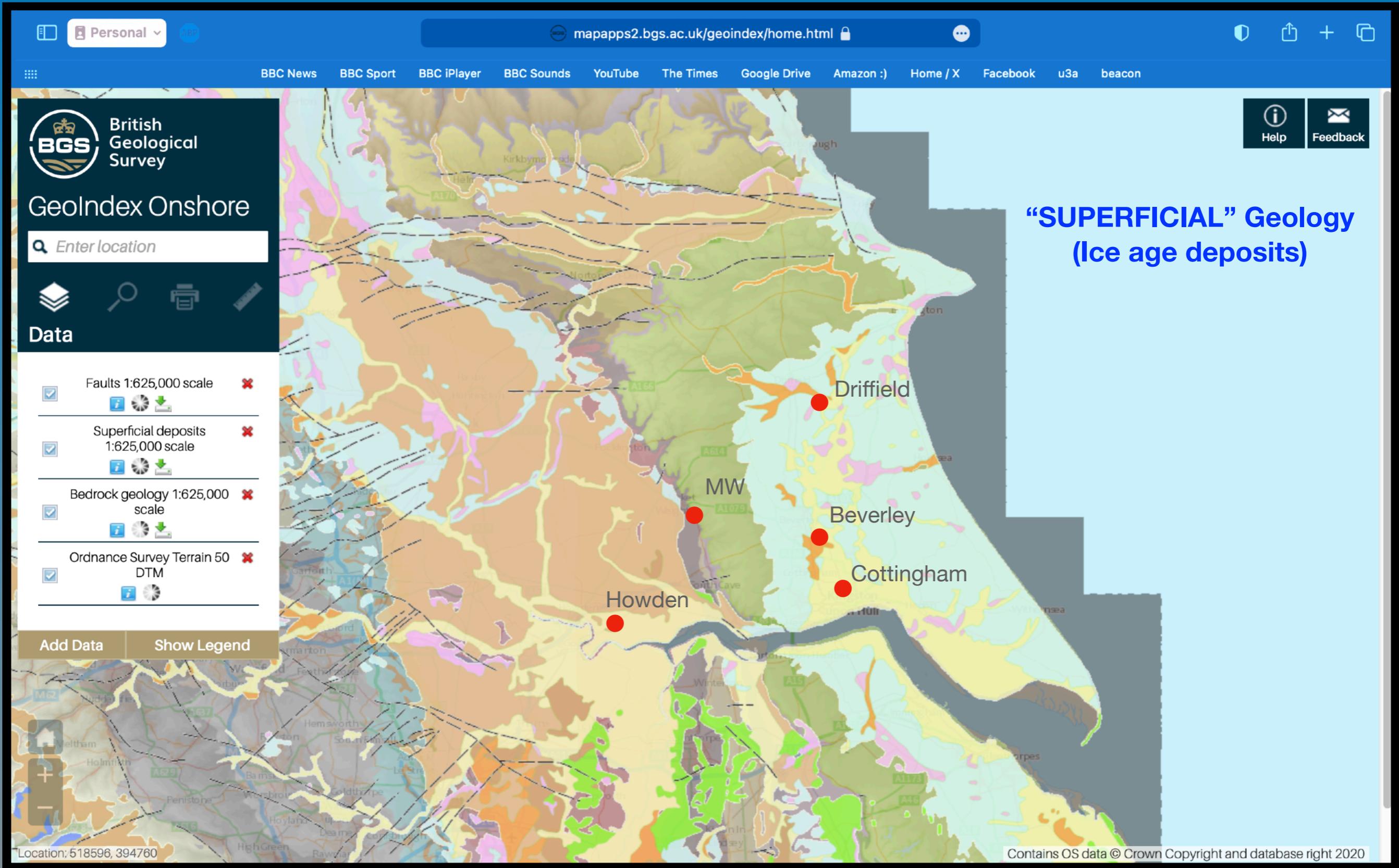
Geological map of East Yorkshire



BEDROCK Geology

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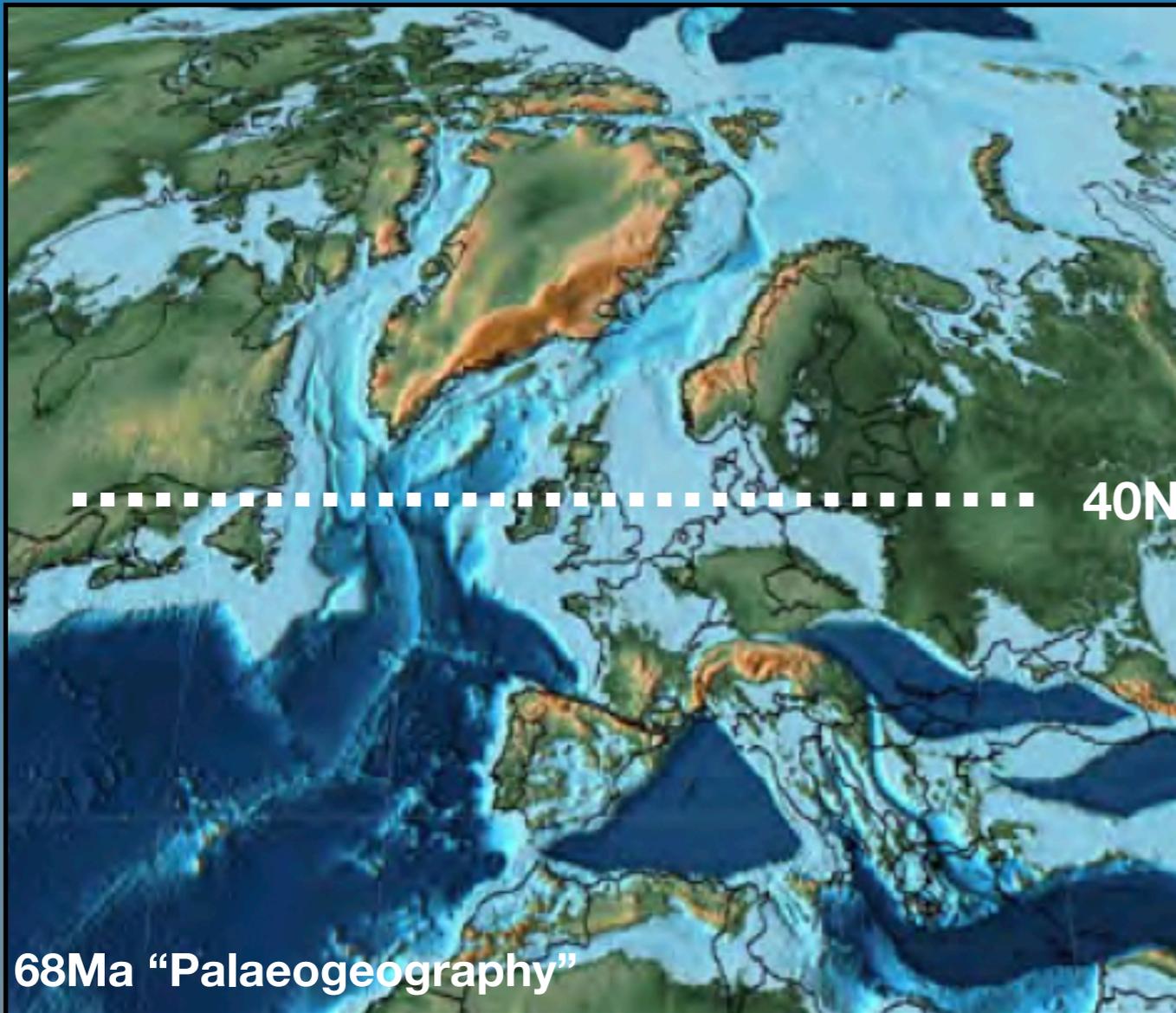
Geological map of East Yorkshire



Geological map of East Yorkshire

The Chalk - Cretaceous - 80 Ma (24th December)

- North Atlantic starting
- No Ice caps
- High CO2 levels
- High Avg Global Temperatures (20C)
- High Sea-Level (est 100 m above today)



Scotese, C 2014 Atlas of Early Cretaceous Paleogeographic Maps

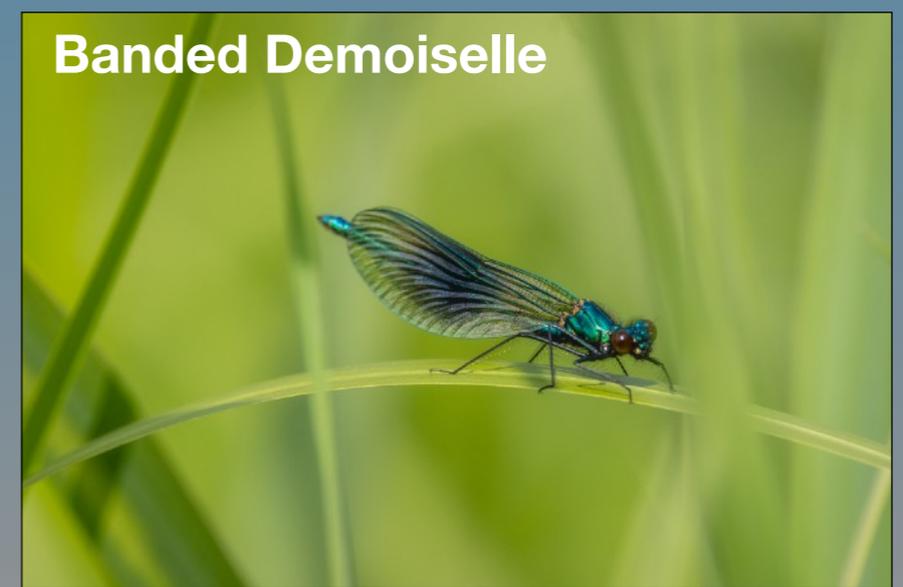


coccolithophore

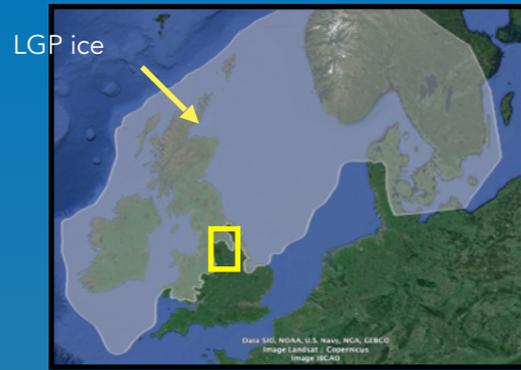


foraminifer

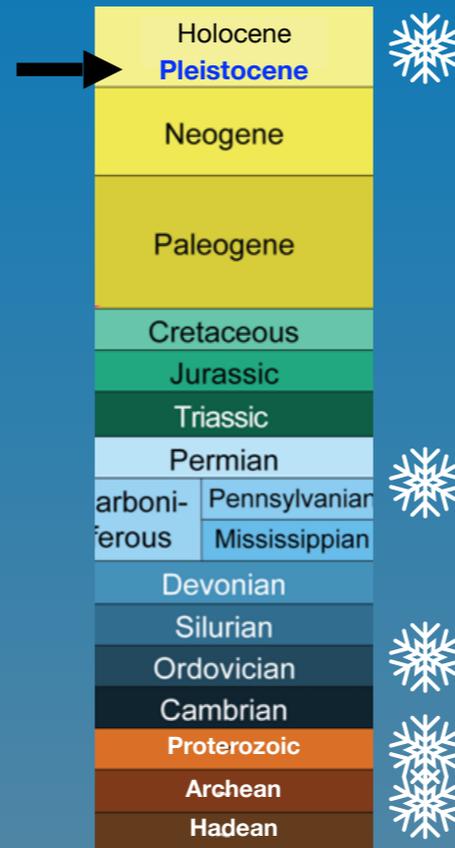
- Chalk is a LIMESTONE
- Deep, warm seas
- Accumulation of layers of sediment made of planktonic algae



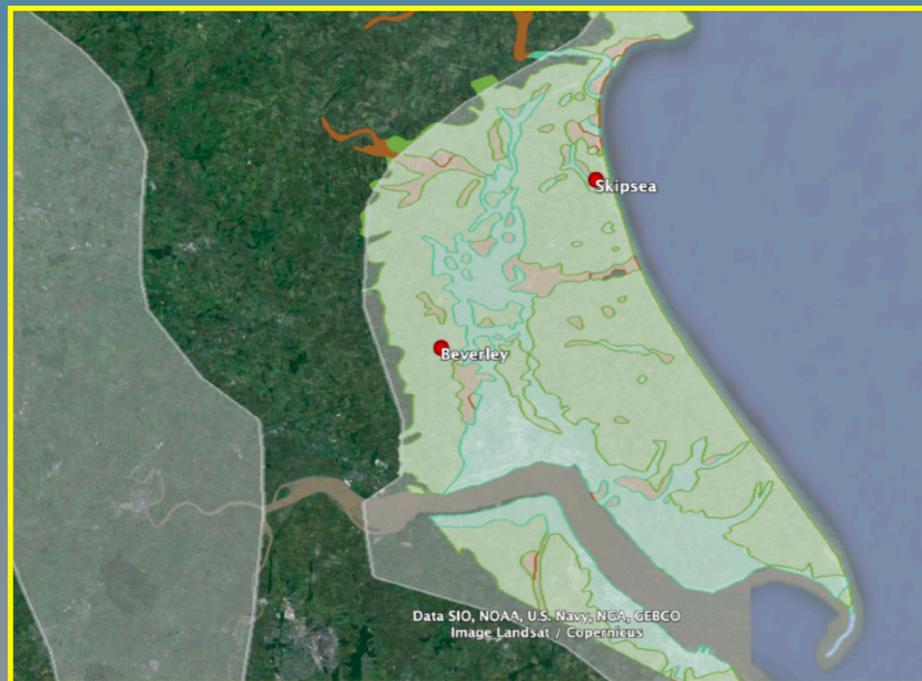
Pleistocene Ice Age



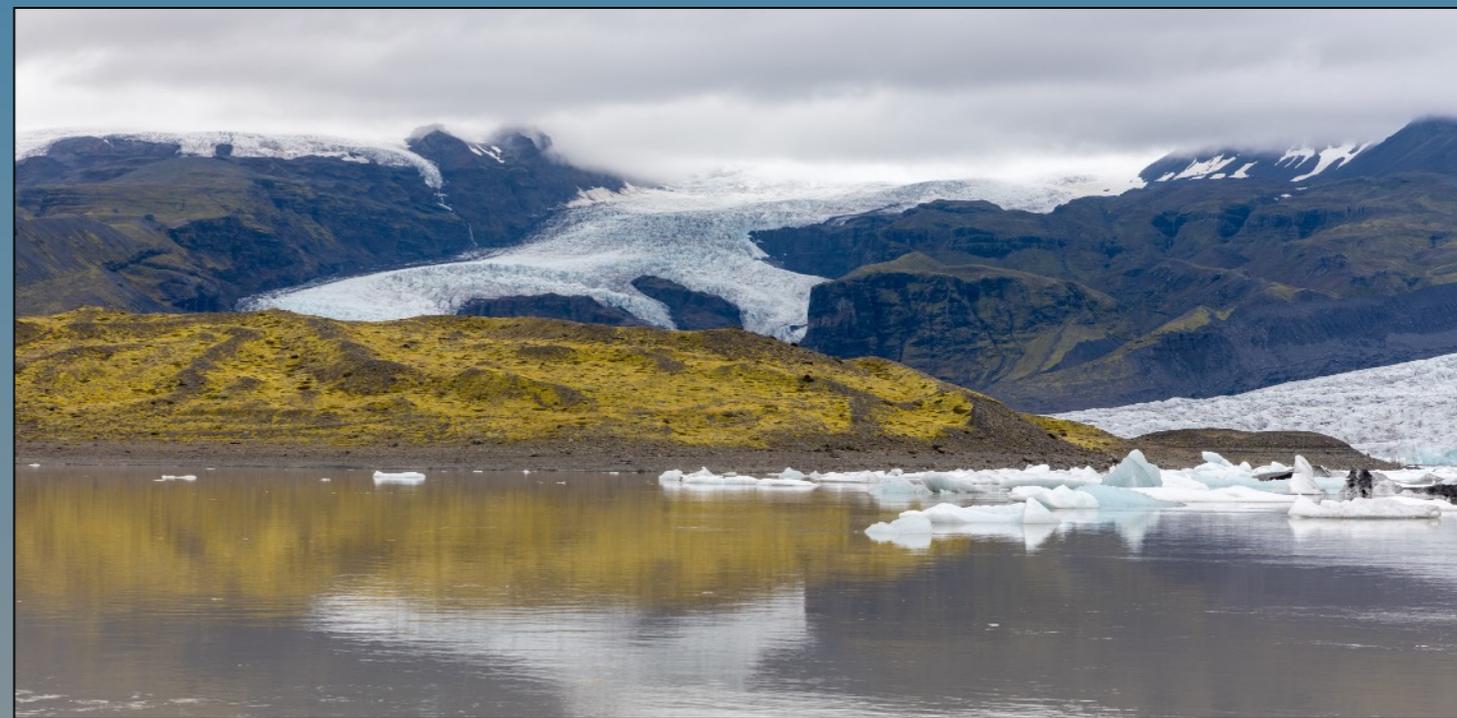
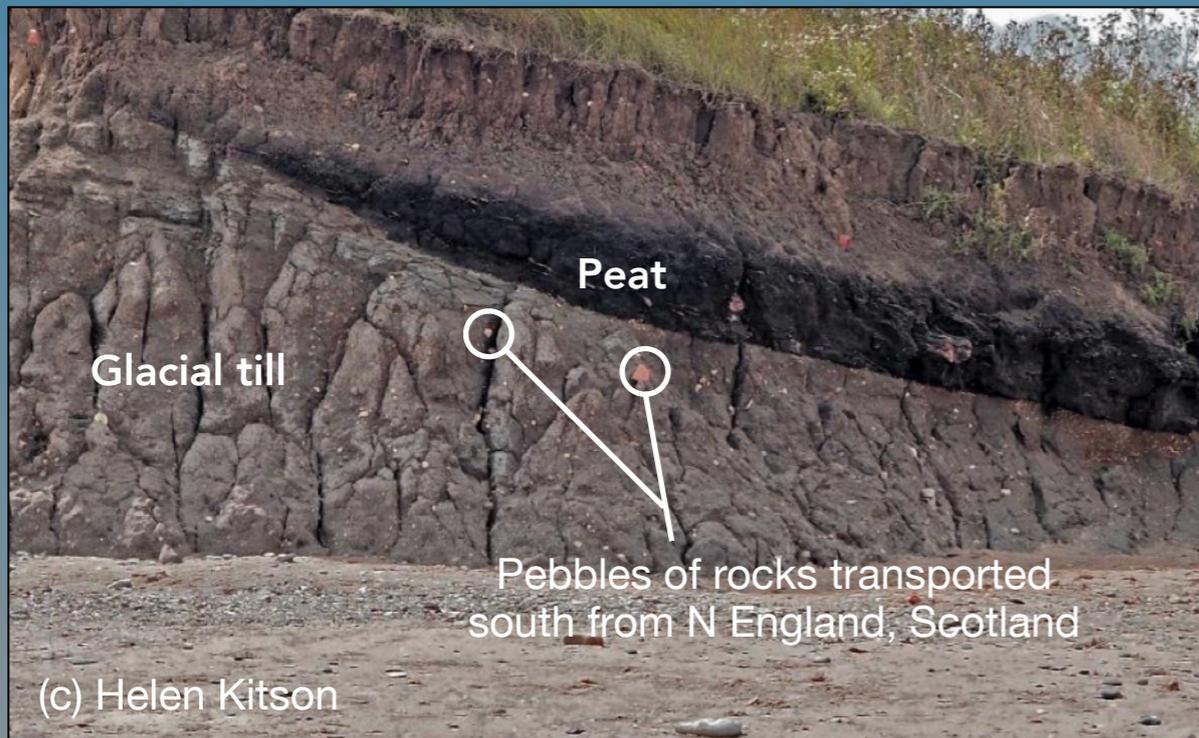
LGP ice from BGS UKRI 2024



What if all the ice melted ?



- The most recent of five ice ages to affect the Earth
- Three major glacier advances over GB
- **Separated by warm(er) "Interglacials", as now**
- Controlled mainly by variations in Earth orbit
- Last Glacial Period (LGP) peaked c 25,000 yrs ago
 - Holderness geology dominated by these glacial, lake and river deposits



LGP Glacial till and Lake/Mere peat deposits, Skipsea



Geology and Industry

(Don't worry..This isn't Beverley....)

Building Stones



All Saints, Sancton

(c) SJT

Holderness GDF ??

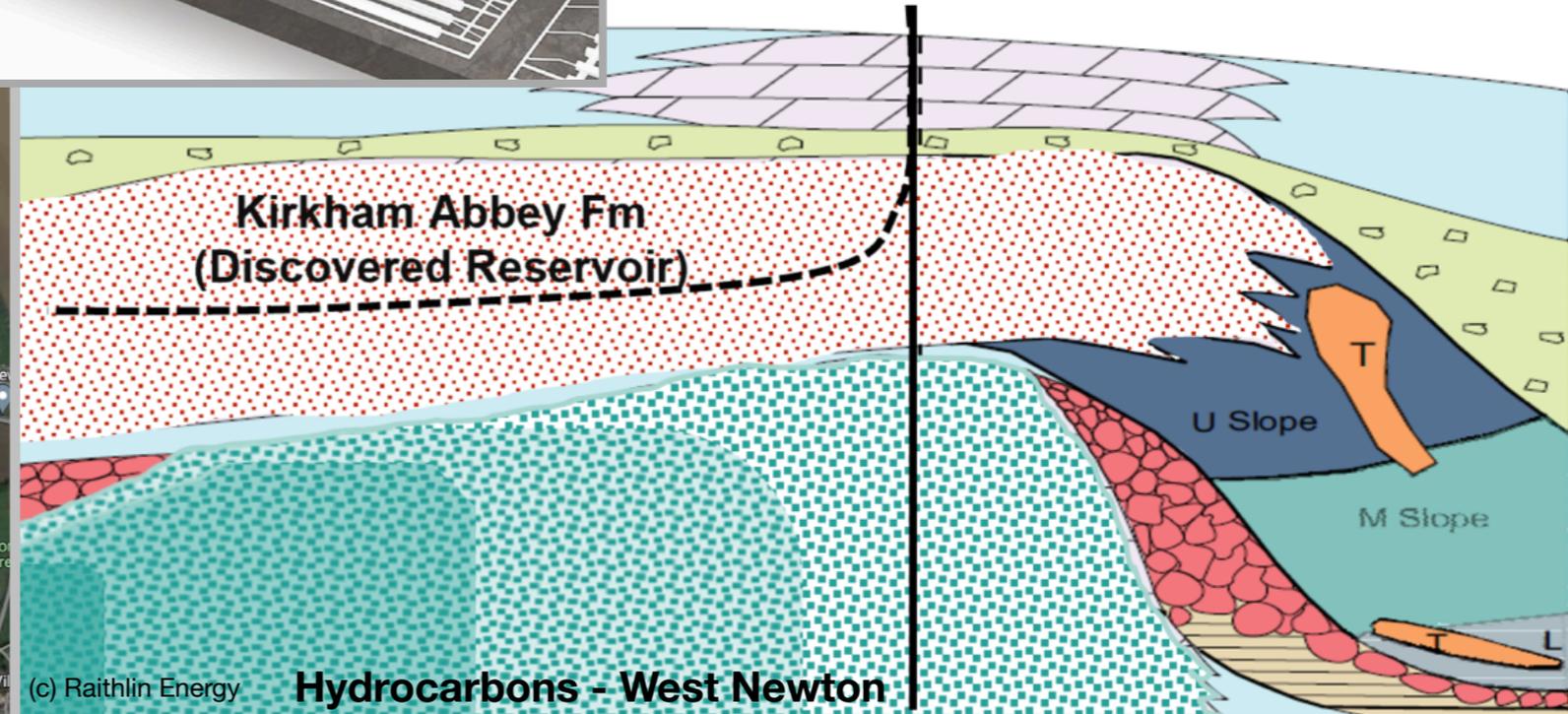


((c) NWS)

Some practical aspects of geology

B-1z (vertical) & Proposed B-2 (horizontal) Wells

SSE



(c) Raithlin Energy

Hydrocarbons - West Newton

Clay, sand & gravel pits



Bredon North Cave

Brooklesby

Chalk quarries



Imerys Beverley

Google Earth

Agriculture



Little Wolds Vineyard, South Cave (c) SJT

Water resources



River Hull Headwaters

Environment Agency



Q & A

Indian Himalaya / Mt Kanchenchunga

Geology Learning Resources

Reading

The Map That Changed the World. Penguin 2002.
Simon Winchester
[The story of William Smith, and the first geological map]

Origins: How the World Made Us. Penguin 2018.
Lewis Dartnell
[How the Earth has shaped human society]

The Earth Transformed. Bloomsbury, 2023
Peter Frankopan
[How human society has shaped the Earth]

Yorkshire Geology. Dovecot Press 2009
Paul Ensom

Surfing

[British Geological Survey](#)
[UK Government agency. Large range of geological data and learning material]

[The Geological Society](#)
[UK professional body. Free learning/teaching material]

[u3a Geology](#)
[TAT - various resources]

[Geological history of Yorkshire](#)
[Brief summary of Yorkshire Geology]

Viewing

[Earth \(BBC 2023\)](#)
[Excellent, up-to-date overview of Earth history]

The Yorkshire Fossil Hunter - [YouTube](#)

Joining

[Hull Geological Society](#)

[Yorkshire Geological Society](#)

